Math 493. Practice problems for Chapter 5.

1. Suppose the r.v. X has distribution function F given by

$$\begin{aligned} F(x) &= 0, \quad x < 0, \\ &= \frac{1}{2}x \quad 0 \le x < 1, \\ &= \frac{1}{4}x + \frac{1}{2}, \quad 1 \le x < 2, \\ &= 1 \quad x \ge 2. \end{aligned}$$

Sketch the graph of F, and find the following probabilities.

$$(a) \quad P(X = 1) \quad (b) \quad P(X = 1.5) \quad (c) \quad P(.5 < X < 1.5)$$
$$(d) \quad P(.5 < X < 3), \quad (e) \quad P(X \ge 1) \quad (f) \quad P(X > 1).$$

2. Suppose that a continuous r.v. X has p.d.f. $f(x) = \frac{1}{4}x$ for $1 < x < 3$ and $f(x) = 0$ for other x.

(a) Sketch the graph of f.

(b) Find $P(1.5 < X < 2))$ and $P(0 < X < 2)$.

(c) Find a formula for the d.f. F, and sketch its graph on $\mathbb{R}$. The formula comes in 3 different pieces.

(d) Find the mean and variance of X.

(e) Find $E(1/X^2)$.

Recommended problems: From p.224, et.seq. 1,3,5,6,7,13,15,16,19,28,33,37-41.

Answers to Problems 1 and 2:

1. (a) 1/4 (b)0 (c) 5/8 (d) 3/4 (e) 1/2 (f) 1/4.

2. (b) 7/32, 3/8 (c)$F(x) = \frac{1}{8}(x^2 - 1)$ for $1 \le x \le 3, ; F(x) = 0$ for $x \le 1, ; F(x) = 1$ for $x \ge 3$. (d)13/6, 11/36 (e) .275.